

Graded Density Carbon Bonded Carbon Fiber (CBCF) Preforms for Lightweight Ablative Thermal Protection Systems (TPS), Phase II

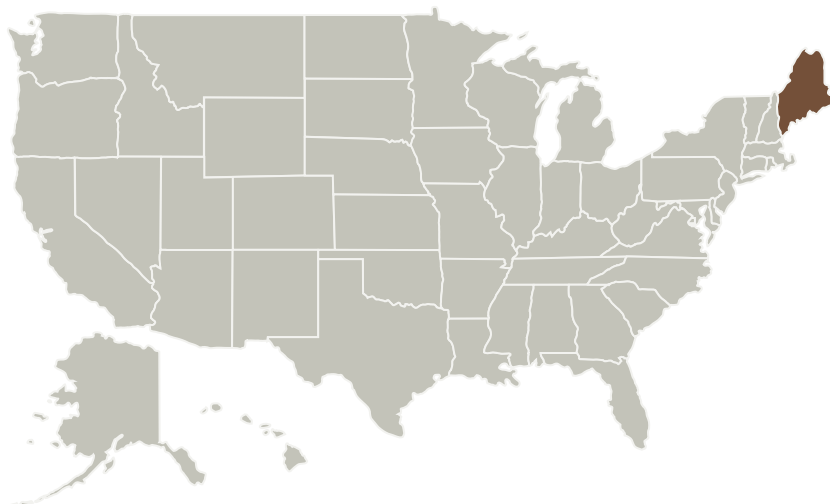
Completed Technology Project (2011 - 2013)



Project Introduction

FMI has developed graded density CBCF preforms for graded density phenolic impregnated carbon ablator (PICA) material to meet NASA's future exploration mission requirements for higher performance ablative TPS. Graded Preform PICA (GPP) will be achieved by the continued development of lightweight, graded density carbon preforms which will decrease the overall areal mass of the resulting TPS material while enhancing its thermal performance capability. The preform material designed to achieve this goal is comprised of a more mechanically robust, ablating outer layer and a lower weight, lower thermal conductivity inner layer than state-of-the-art PICA material. The ablative outer layer and thermal inner layer will be integrated in a continuously cast, monolithic material with equivalent capability for resin impregnation and conversion to PICA as the baseline existing preform material (FiberForm®). During the proposed Phase II program, FMI will continue to develop its capability to produce graded density preform material to achieve TPS areal mass reductions estimated between 17-25% relative to PICA with the goal of improving ablation performance. The developed preform materials will be converted to GPP and then characterized mechanically, thermally, and tested for ablation performance. In addition to providing a pathway for these enhancements to tile acreage PICA TPS ablator material, FMI will incorporate the developed processing methodology to produce near net-shaped cast PICA TPS material preforms with a reduced density gradient compared to baseline manufacturing techniques.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
Fiber Materials, Inc.	Supporting Organization	Industry	Biddeford, Maine

Primary U.S. Work Locations

Maine

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
 - └ TX14.3 Thermal Protection Components and Systems
 - └ TX14.3.1 Thermal Protection Materials